How is such agreement reached? Naively, one might think such agreement results from a detailed understanding of how the instruments and techniques operate. But, just as most of us do not understand the operation of our visual system, scientists frequently do not understand how their instruments and techniques work, at least at the level of detail that is required to counter concerns about artifacts. Golgi staining is an extreme but illustrative example. Camillo Golgi introduced the silver nitrate stain in the 1880s and, in the hands of Ramon y Cajal, it provided much of the evidence that established that neurons are discrete cells. What made it effective is that it stains only some of the neurons in a preparation, thereby making clear that the dendrites and axons of one neuron are not continuous with those of another. Yet, more than a century later scientists still do not understand why it stains only a few neurons in a preparation. Even though in most cases scientists do figure out how their instruments and techniques operate, much of that knowledge may not be obtained until long after the instruments and techniques have been put into common use. Moreover, as Ian Hacking pointed out, changes in the understanding of how the evidence is procured has little effect on its acceptance:

> Visual displays are curiously robust under changes of theory. You produce a display, and have a theory about why a tiny specimen looks like that. Later you reverse the theory of your microscope, and you still believe the representation. Can theory really be the source of our confidence that what we are seeing is the way things are? (1983. p. 199)

These reflections pose an important question: how do scientists assess their instruments and techniques to determine whether they are providing information about the phenomena of interest or merely artifacts? This is a question about what I will call *the epistemology of evidence*. I will be exploring that question in this chapter in the context of discussing the instruments and research techniques that proved critical to the ability of cell biology to enter into the no-man's-land between cytology and biochemistry in the 1940s and beyond.

As the previous chapter demonstrated, before 1940 cytology and biochemistry had developed largely in isolation from each other. Many researchers in both fields recognized the potential for fruitful interaction, but made little headway due to the lack of research tools that could yield detailed images of cytoplasmic structures and help relate them to biochemical functions. By 1940, though, researchers were employing new instruments and developing techniques for using them toward these ends. As often happens, the instruments with the greatest impact had been developed in other fields of science. Biologists therefore had to develop specialized techniques for turning these